# HAWAII DEEP WATER CABLE PROGRAM

## History of the Program

The need for an underseacable between the Big Island and Oahu was expressed in the Hawaii Integrated Energy Assessment if full scale development of the Big Island geothermal field was to proceed. (HIEA Executive Summary, January, 1981)

The cable was discussed by the Geothermal Advisory Committee in 1979.

In 1979 Hawaiian Dredging and Parsons and DPED discussed geothermal development in Hawaii with Union Oil and Thermal Power who were not interested in geothermal development with no large power market.

In 1979 Parsons approached DOE about a cable study, but DOE would not sole source Parsons on a contract. HECO then submitted an unsolocited proposal in February, 1980.

In December 1980 Senator Inouye succeeded in securing from President Carter immediate release of $200,000 and an additional $2.5 million in early January 1981. President Reagan recinded these funds for a cable study upon assuming office.

Kent Keith met with Sen. Henderson in 1981. Act 1, First Special Session 1981, Item A-6 Alternate Energy Demonstration and Commercialization Projects authorized $1.2 million of which $300,000 was released for the HDWC program in August 1981, by the Governor.

The State appropriation demonstrated that the project was a worthwhile effort to the DOE.

In September 1982 DOE authorized $16.6 million of which $9.354 million was approved in a contract with HECO. As of 1985 the $9.354 has been released to HECO.

## Position on Capacity

HECO projected their capacity requirements for 1995 at an estimate that would allow for 500 megawatts of geothermal. This figure was then used for the cable capacity.

## Timeframe for Cable Commercialization

Completion of the cable feasibility study is scheduled for 1990. If the economics prove to be acceptable the cable could be commercial by 1995.

## State Energy Functional Plan

HDWC is included in B(2)(h). Implementing Action: Deep Water Electric Cable - Develop and demonstrate interisland electrical energy transmission technology.

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FACTS AND ISSUES

FACTS

1. In 1983 HECO and DOE entered into a contract with a $16.6M ceiling (subject to appropriation) ending June 1985.

2. $10.8M has been appropriated, of which $1.4M is for a DOE support contract, leaving $9.4M for the HECO contract.

3. In early 1985 both DOE and HECO recognized that budget and schedule were inadequate.

4. DOE granted a no-cost time extension through December 1985.

5. HECO submitted a proposed contract modification on September 5, 1985. Cost ceiling $21.9M, schedule through March 1990. The proposal was developed in close concert with DOE.

6. DOE programs office completed review of proposal in December and, with minor revision, recommended approval.

7. Proposal is now before Donna Fitzpatrick; without her approval, DOE Procurement Operations cannot process the modification.

8. DOE granted another no-cost time extension through March 1986.

ISSUES

1. Duration of the proposed modification appears to be inconsistent with OMB directive to terminate contracts extending past FY 1987.

2. In the absence of a contract, HECO has no authority to expend funds already appropriated.

3. The existing contract does not reflect all work being done now nor does it identify accurately work remaining under the program.

4. Another no-cost time extension may be possible, but is not desirable.

5. Highest priority is for DOE to approve proposed contract modification. Since this involves apparent conflict with

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OMB, it will not be resolved other than by Donna Fitzpatrick (Asst. Sec., Conservation and Renewable Energy) or John Herrington (Sec. of Energy).

6. FY 1987 appropriation in the amount of $3.7M is required. Total required appropriations FY 1987-FY 1990 are $12.6M.

7. Congressional delegation will have to take the lead on FY appropriations. DOE cannot support additional funds under deficit reduction.

8. Appeal to DOE is to put in place the contractual vehicle which:

   a. Represents a government/contractor consensus of work required (meets program objective).

   b. Remains subject to appropriation, as is the present contract.

   c. Allows continued expenditure of funds already appropriated.

   d. Recognizes an interdependency with an ongoing State commitment to the project ($4M already funded, additional $1M being sought from State Legislature).

   e. Encourages the continued investment of private capital for geothermal development.

9. Efforts by Congressional delegation to obtain FY 1987 appropriation can be deferred for a few months, observing the development of the deficit reduction program. This effort will be needed, but the issue is timing and the timing is not now.

10. In addition to the direct benefits to Hawaii, the program has substantial technology transfer potential of national benefit (details attached).

W.A. Bonnet
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TO: Donna Fitzpatrick
Acting Assistant Secretary for Conservation

THRU: Russell Eaton, III
Program Manager

HAWAII DEEP WATER CABLE (HDWC) PROGRAM

Applicability of Submarine Cable Technology to Other Technical Areas

As requested by John Shupe, I am providing you with a summary of potential applications for the Hawaii Deep Water Cable Program Technology outside the State of Hawaii.

The submarine cable R&D program involves the demonstration of the technical feasibility of manufacturing, testing, displaying, retrieving and operating underwater power cables to depths of 1900 meters (6300 feet) over rugged bottom terrain. The present R&D effort is structured to address each of these technical challenges in a manner which assures maximum technology transfer to the United States underground/underwater power cable industry.

The successful development of a viable deep water submarine cable system will advance the state-of-the-art technology in the United States for both domestic and international markets. Solution of the technical barriers for these cables will permit application of both underwater and land transmission systems which require below grade installations. Long distance direct current (dc) transmission systems will be enhanced with the availability of a commercially proven technology for crossing bodies of water or sensitive land areas which require consideration of underwater/underground cable systems. Integration of renewable energy sources remote from urban load centers could be implemented on a larger scale with a U.S. cable technology base capable of underwater/underground placement to solve sensitive environmental issues. Renewable resources such as geothermal energy, wind energy, solar electric and hydroelectric power can be made more economically and technically viable with a dc cable system which is available to minimize environmental impacts such as federally controlled lands, conservation areas, protected forest lands, historic sites, archeological sites and areas requiring special consideration to maintain aesthetic qualities.

Complimenting the enhancement of domestic applications, the building of a technology base in the U.S. will increase our competitive position in the international marketplace for both supply and services. Submarine cable projects, underground transmission systems and long vertical generator leads for hydroelectric power stations outside the United States typically require oil-filled cables of the type being developed for the Hawaii Deep Water Cable Program. Since many international power development contracts are awarded as design and build projects, U.S. business opportunities have been restricted due to the absence of a commercial capability to design and furnish oil-filled cables. Removal of this barrier will improve U.S. competitive success to offer services and supplies for these types of projects.

As examples of the types of projects which would be considered potential candidates for the deep water cable project, a summary of applications is tabulated below. These projects vary between long range planning targets to those which

are under active development. These projects embrace the two critical aspects of the deep water cable technology -- large depths and long distances. Many, if not all, of these projects have been hampered in their implementation because of the high technical risks associated with the technology development for long distance and deep water submarine cables.

| Connection | Approx. Depth (m) |
|---|---|
| Canary Islands (Spain) | 2500 |
| Italy - Greece | 900 |
| Turkey - Cyprus | 1000 |
| OTEC Project | 1800 |
| Canada-USA along Pacific coast | 1000 |
| Italy - Corsica | 700 |
| France - Corsica | 3000 |
| Spain - Baleares Islands | 900 |
| Ceuta - Algeciras (Spain) | 1000 |
| Lipari Islands (Italy) | 1000 |
| Caribbean Islands (Barbados) | 1800 |
| Taiwan - China | 500 |
| Singapore - Indonesia | 600 (600 km in length) |
| Hokkaido - Honshu | 300 |
| Florida - Bahamas | 400 |
| New Foundland - New York along Atlantic Coast | 200 (600 km in length) |
| South Pacific Islands (Various) | 600-1000 |

In summary, the deep water submarine cable program has important spinoff potential to assist in increasing the technical and economical viability of renewable energy sources by providing a critical link in the successful development of these resources. Further, the U.S. competitive posture in large power projects abroad can be enhanced by the availability of the required cable technology. This could permit the successful export of U.S. services and manufacturing products in areas where competition has precluded U.S. participation because of a lack of technology.

W. A. Bonnet
HECO Program Manager

bcc: John Shupe
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Gary Fontana